

Docket No.: 042390.P7045D

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Ramalingam, et al.

Application No.: 09/874,666

Filed: June 5, 2001

For: A Controlled Collapse Chip  
Connection (C4) Integrated Circuit  
Package Which Has Two Dissimilar  
Underfill Materials

Examiner: David E. Graybill

Art Group: 2827

## AMENDMENT AND RESPONSE TO THE OFFICE ACTION

BOX NON-FEE AMENDMENT  
Assistant Commissioner for Patents  
Washington, DC 20231-9998

Sir:

In response to the outstanding Office Action, mailed March 7, 2002, please amend the  
above-identified Application as follows:

IN THE CLAIMS

Following is a complete set of claims as amended with this Response. This complete set  
of claims excludes cancelled claims 15-25 and includes amended claims 7-14 and new claims 26-  
30.

- 1 7. (Amended) A process for underfilling an integrated circuit that is mounted to a  
2 substrate, comprising:  
3 dispensing a first material acting as underfill which becomes attached to the integrated  
4 circuit and the substrate; and,

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5 dispensing a second material acting as underfill, the second material having a lower  
6 adhesive property than the first material.

1 8. (Twice Amended) The process as recited in claim 7, wherein the first material  
2 flows between the integrated circuit and the substrate.

1 9. (Twice Amended) The process as recited in claim 8, wherein the substrate moves  
2 within an oven while the first material flows between the integrated circuit and the substrate.

1 10. (Twice Amended) The process as recited in claim 7, wherein the second material  
2 is dispensed in a pattern which surrounds the first material.

1 11. (Twice Amended) A process for underfilling an integrated circuit that is mounted  
2 to a substrate comprising:  
3 heating the substrate before a first material is dispensed;  
4 dispensing the first material acting as underfill, the first material becoming attached to the  
5 integrated circuit and the substrate; and,  
6 dispensing a second material acting as a circumferential fillet, the second material having  
7 a lower adhesion property than the first material and becoming attached to the integrated circuit  
8 and the substrate.

1 12. (Twice Amended) The process as recited in claim 11, further comprising heating  
2 the first material to a gel state.

1 13. (Twice Amended) The process as recited in claim 12, wherein the substrate is  
2 heated to a temperature that is greater than a temperature for heating said first material to said  
partially gel state.

1 14. (Twice Amended) The process as recited in claim 11, further comprising  
2 mounting the integrated circuit to the substrate with a solder bump before the first material is  
3 dispensed.

1 15. (Cancel)

1 16. (Cancel)

1 17. (Cancel)

1 18. (Cancel)

1 19. (Cancel)

1 20. (Cancel)

1 21. (Cancel)

1 22. (Cancel)

1 23. (Cancel)

1 24. (Cancel)

1 25. (Cancel)

1 26. (New) An integrated circuit package comprising:

2 a substrate;

3 an integrated circuit attached to the substrate;

4 a first material placed between the substrate and the integrated circuit as underfill; and

B<sup>2</sup> 5 a second material placed around edges of the integrated circuit and the first material to act  
6 as a circumferential fillet, the second material having a lower adhesion property than the first  
7 material.

1 27. (New) The integrated circuit of claim 26, wherein the second material is an  
2 anhydride epoxy.

1 28. (New) The integrated circuit of claim 26, wherein the substrate is baked at a  
2 temperature greater than a temperature at which the first and second materials are applied.

1 29. (New) The integrated circuit of claim 26, wherein the second material seals the  
2 first material.

1 30. (New) The integrated circuit of claim 26, wherein the second material is applied  
2 at a temperature less than a temperature at which the first material is applied.

REMARKS

This Amendment is in response to the Office Action mailed March 7, 2002. In the Office Action, claims 7-25 were rejected under 35 U.S.C. §112, second paragraph. In addition, claims 7, 8, 10-12 and 14 were rejected under 35 U.S.C. §102(b) and claims 9, 13 and 15-25 were rejected under 35 U.S.C. §103(a). Applicants respectfully traverse the rejections in their entirety. Claims 7-14 have been amended and claims 15-25 have been cancelled without prejudice. Claims 26-31 have been added.

I. REQUIREMENT UNDER 37 C.F.R. § 1.105

The term "Shin-Itsu" is a typographical error. The company name is properly spelled "Shin-Etsu" as identified by the Examiner. Both Semicoat 5230-JP and Semicoat 122X are properly named materials and were in use at the time of the filing of the application. A copy of the confirmation by Shin-Etsu Chemical Co. Ltd. is enclosed herewith as Appendix A.

II. REJECTION UNDER 35 U.S.C. § 112

Claims 7-25 were rejected under 35 U.S.C. §112, second paragraph, as being allegedly indefinite. With respect to the phrase "underfill material", Applicants have deleted the term "underfill" and has amended independent claims 7, 11 and 26 to represent that such material is used as either underfill or circumferential fillet.

With respect to the phrase "partial gel," Applicants respectfully traverse the rejection that the phrase is indefinite. The phrase clearly represents a state at which the first material possesses a "gel" characteristics but may not be completely formed as a gel. Applicants have revised claims 12, 18 and 22 to remove the term "partial" and respectfully submit that deletion of the term "partial" still conveys within the claim that the material has "gel" characteristics and need not be completely in gel form.



In light of the foregoing, withdrawal of the § 112 rejection is respectfully requested.

II. REJECTION UNDER 35 U.S.C. § 102(b)

Claims 7, 8, 10-12 and 14 were rejected under 35 U.S.C. §102(b) as being anticipated by Ameen (0340492). Applicants respectfully traverse the rejection in its entirety and requests the Examiner to reconsider allowability of the pending claims in light of the modifications made above. For instance, as an example, it is respectfully submitted that Ameen does not disclose each and every limitation set forth in pending claims 7, 8, 10-12 and 14. As one example, there is no teachings in Ameen that the second material (44) has a lower adhesion property than the first material (41) as now claimed. Withdrawal of the §102(b) rejection is respectfully requested.

III. REJECTION UNDER 35 U.S.C. § 103(a)

Pending claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ameen (0340492), and pending claims 9 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Ameen in view of Bouras (U.S. Patent No. 5,906,682). Applicants respectfully traverses the rejection and respectfully submits that neither Ameen nor Bouras, alone or in combination, describe or even suggest that the second material has a lower adhesive property than the first material as now set forth in independent claim 7 from which claim 13 depends. Withdrawal of the §103(a) rejection is respectfully requested.

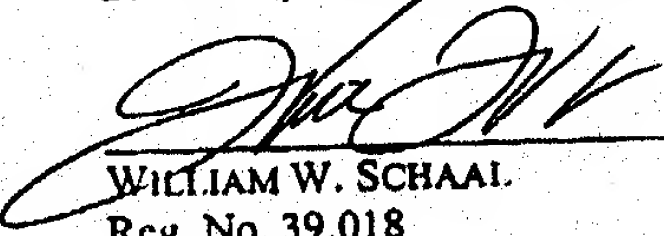
CONCLUSION

In view of the amendments and remarks made above, it is respectfully submitted that all pending claims are in condition for allowance, and such action is respectfully solicited.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

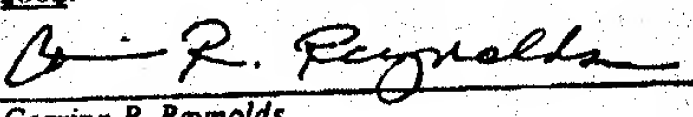
Dated: May 22, 2002

  
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CERTIFICATE OF MAILING

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Corrin R. Reynolds 5/22/02  
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